

*** FORM V.E. SYSTEM DESIGN AND CHANNEL CAPACITY**

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The County considers system design and channel capacity to be an important part of any application, characterizing the facilities and equipment to be provided by the Applicant.

1. The Applicant shall describe the design of any system it proposes to build or operate (including but not limited to the HSN and I-Net) and include, at minimum, the following information:

- a. Channel capacity on the home subscriber network

- (1) Downstream:

Frequency Spectrum	50 – 750 MHz
Channel Capacity	110 Analog
Channel Capacity initially activated	78 Analog; 210 Digital
Type of transmission (digital, analog)	Both

- (2) Upstream:

Frequency Spectrum	5 – 40 MHz
Channel Capacity	N/A
Channel Capacity initially activated	N/A
Type of transmission (digital, analog)	Digital

- b. Channel capacity on the I-Net

- (1) Number of single-mode fibers to each site (attach list)

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(2) Backbone fiber count:

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Attach (i) maps showing the distribution of fiber counts in the backbone and hubs, and (ii) logical maps showing the fiber routing from hub sites to all user sites. Maps shall be provided both in hardcopy (at a scale so that the map representation is no smaller than 500 feet per inch) and in a CAD or other electronic format approved by the County.

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- c. Proposed timetable for making additional downstream and upstream capacity available on both the HSN and the I-Net.

HSN – No plans for providing additional capacity at this time.

I-Net – See response to Form V.B.

- d. Proposed method, channel capacity, equipment, and timetable to be used to link access facilities and the headend and to permit routing of signals to the subscriber network.

The Reston access facility (Channel 28) currently is served by a fiber link from the studio located at 12345G Sunrise Valley to the Reston headend facility located at 1720 Wiehle Avenue. Access facilities outside of the

Reston Franchise Area are connected to Comcast's cable system via a fiber link from Merrifield (Cox) to the Reston headend facility located at 1720 Wiehle Avenue.

- e. Proposed method, channel capacity, equipment and timetable to be used to link public facilities to the I-Net.

See response to Form V.A. and V.B.

- f. Describe any additional upstream system capability from public facilities to access facilities and/or the headend.

The Grantee already provides links from PEG access origination sites. Any additional or replacement links the County desires should be at its expense. However, if these links are part of the County's proposed I-Net, our proposal on that subject would cover this subsection.

- g. HSN and I-Net Design Type

Trunk and feeder design

The HSN is a hybrid fiber-coaxial (HFC) network with redundant fiber to all nodes (primary and secondary).

The Existing I-Net is a modified HFC network as described in Form V.E. System Design and Channel Capacity Section 1.b.

Number and location of hubs or nodes

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Number of fibers (from hubs to each node; from headend to hubs)

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Type of fibers (*e.g.*, 1310 or 1550 nm optimized; single-mode or multimode)

The fiber is single mode optimized at 1310 nm manufactured by Siecor utilizing Corning glass.

Number of feeders to each node

There are a maximum of four (4) feeder ports on each node. Not all nodes use all available ports.

Dark fiber in plant

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Number of fibers from each hub to each I-Net location

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- h. Distribution system, including copper-based cable, fiber, and equipment to be used. (Provide manufacturer, type of equipment and model number, and physical and technical specifications, and include cable, fiber, active electronics, and passive electronics).

We have no operational or economic reason for maintaining records of make and model numbers for the distribution system; however, we have listed the equipment below. This objection applies to the request for make and model numbers in m., n., p. and q.

The current Reston HFC HSN utilizes Philips 750 MHz optical nodes and amplifiers; Antronix 1 GHz taps and passives; Alpha Technologies XM2 90 volt standby power supplies; Commscope P3 series (or equivalent) .500, .625, .750 & .875 coaxial cable; and Siecor single mode fiber, optimized for 1310 nm and using Corning glass for the fiber strands.

- i. Use (if any) and capabilities of converters proposed, and conditions under which converters will be made available. The Applicant should specifically indicate whether any converters used are capable of allowing subscribers to simultaneously receive one video signal, and record another. Include input capabilities, (RS-32, RJ-11, F-Connector, etc.), technical specifications including noise figures, throughput (lines of resolution).

Converters currently in use are: Scientific-Atlanta (SA) Analog Addressable; SA Digital (in SD, HD and DVR). The DVR allows subscribers to simultaneously receive one video signal, and record another. Input to all converters is via an “F” connector.

- j. Plans to operate or contract for transmission services using the following services: common carrier; Cable Television Relay Service (CARS); Multipoint Distribution Service (MDS); other (please specify).

We currently contract with Verizon for fiber optics to transmit and receive the Telemundo and Univision signals.

- k. Plans to operate or contract for satellite earth stations, including appropriate technical specifications (e.g., size of antenna; manufacturer of antenna; lownoise amplifier make, model number and noise figures; receiver make, and model number; standby power; etc.)

We utilize a variety of Television Receive Only (TVRO) earth stations to receive satellite transmissions. Some are local, some are located at other Comcast facilities and deliver their signals to Reston via Comcast fiber links.

- l. Service level separation -- tier isolation and pay isolation. Describe design specifications for delivery of any pay cable services, including methods of security. If more than one service tier is to be provided, describe how lower tier subscribers will be isolated from receiving upper tiers of programming. Additionally, please explain whether converters or other terminal equipment will be necessary to receive the basic service tier.

Converters are not required to receive the basic service tier or the expanded basic service. The expanded basic service is trapped, so that

basic only subscribers cannot receive its signals. Digital services are encrypted (excluding local broadcasts), so a converter box is required to receive high-definition broadcast channels. Analog premium services are scrambled using sync-suppression, and digital premium services are encrypted.

- m. Headend design and reception facilities, including make and model number of antennas, signal processors, modulators, demodulators, etc., and any plans to bring broadcast channels in over fiber or coaxial cable rather than over the air.

The Reston headend facility receives HSN services via TVRO, broadcast antenna, common carrier fiber, Comcast regional network fiber, Cox/Comcast interconnect fiber, and the Reston I-Net and the Reston Community Channel coax and/or fiber feeds.

Received analog services are processed or modulated using Scientific-Atlanta equipment. Both Scientific-Atlanta 6300 series modulators/processors and 9820 (Continuum) modulators are used to process analog signals. QAM D9476 Digital Modulators are used to process digital signals. Scientific-Atlanta D9228 and 9660's are used to process satellite signals, as well as Motorola DSR1500's; IRT's; IRD's; and DSR4400MD's. Digital programming services are received via the Comcast regional fiber network and combined with the local analog carriers. Primary feeds for local broadcast channels are converted to fiber as agreements are reached.

- n. Plans for standby power at the headend, hubs/nodes, and satellite terminals. Provide the make and model number of equipment, as well as reserve capacity.

The headend is backed up by an uninterruptible power supply (UPS) and generator. Nodes and plant actives have Alpha XM2 standby power supplies. Satellite terminals are not applicable. Existing UPS, generator and standby power supplies are sufficient to satisfy current load requirements.

- o. The type of status monitoring system to be used and extent to which it is used (converter, amplifier, node, etc.). Provide capabilities of the status monitoring system (noise, signal strength, voltage, power factor, etc.). Provide the approximate number of transponders and type of headend monitoring equipment.

Currently only subscriber modems are monitored. Modems are only monitored to ensure that the equipment and plant are functioning. The content of any signal transmitted or received by a subscriber is not

monitored. Open NMS tools are used to perform this function. The modems are monitored 24/7. The monitoring of subscriber modems also serves as a early detection tool for the HSN plant.

Comcast does intend to install status monitoring on all power supplies and at all optical node locations in 2005. All transponders installed will be DOCSIS compliant. The power supply transponders will be either an AM or Tollgrade (Cheetah) product. Final selection will be made before the end of 2004. There are 66 power supplies in the Reston system.

The optical node monitoring system will be accomplished utilizing Pathtrak products. Seven (7) RPM1000 cards will be used to receive the information from the nodes (each card will accommodate eight (8) nodes) and one (1) HCU1500 will house the RPM1000's (one HCU1500 can accommodate 15 RPM1000's). One (1) HSM1000 modem will be used to communicate with the Pathtrak server. The Pathtrak server will be a dedicated computer running the Pathtrak status monitoring software. The server will be located either in the Manassas Call Center, or the Local Management Center (LMC), which is located in Baltimore. All status monitoring systems, once they are activated, will be monitored 24/7 in both locations.

- p. The Emergency Alert System proposed, including: make and model numbers of equipment; whether the system will override all audio and video channels or only audio channels; how the system will be activated and from where; and how the system will be interfaced with the cable system in the Reston franchise area.

The current Emergency Alert System (EAS) is compliant with both FCC and current Franchise requirements. The County may access the system to the extent that it is consistent with national and state EAS procedures, regulations and plans and if the County has the necessary digital equipment to access the EAS system.

- q. The type of audio leveling equipment to be used, including make, model number, and technical specifications.

The system uses AGC and Analog modulators. The County contracted with Columbia Telecommunications Corporation (CTC) to inspect the Comcast physical plant and headend on February 18-19, 2004. Make and model numbers of the audio leveling equipment are listed in the Comcast Cable System Testing and Inspection Report on page 2 of the Executive Summary.

- r. The type(s) of channel blocking and security technologies that will be employed (*e.g.*, interdiction, traps, scrambling).

Analog Pay services are scrambled. Expanded Basic service is trapped. Digital and Digital Pay service (excluding local broadcast) is encrypted. Digital converters and analog addressable converters have parental control capability (subscriber generated PIN). We also purchase single channel traps for cable ready TV sets, to be used for customers who wish to trap individual channels.

- s. Plans for two-way activation to the home, including a timetable for activation, and equipment to be used.

Reston is 100% active 2-way plant.

- t. Expected performance characteristics of the HSN and the I-Net, including, but not limited to:
 - i. the specification of minimum performance standards of voice, video and data (including maximum bit error rate, carrier-to-noise, carrier to composite disturbances, hum modulation) upstream and downstream from origination points (regardless of whether the point of origin is the headend or some other location); and

We currently meet or exceed FCC and industry established standards for all analog and digital transmissions.

- ii. temperature ranges under which the HSN and I-Net will be designed to operate without substantial signal degradation; catastrophic failure; or irreversible performance changes.

System is designed to operate at an ambient temperature of 78°F., and within a temperature range of -20° F. to +120° F. without any substantial signal degradation or failure.

- u. Longest amplifier cascade in the system (number of amplifiers, number of miles, type of cable/fiber).

The longest cascade is six (6) (optical node plus five (5) amplifiers). Longest coaxial cascade distance is approximate 1.5 miles. Cable is Commscope P3 series, or equivalent. Fiber is Siecor single mode fiber, optimized for 1310 nm, using Corning glass for the fiber strands.

- v. Provide design maps for the system. The system design shall be shown on maps using standard symbology in the format of the County's tax maps, and

shall depict all electronic and physical features of cable plant. Such maps shall be provided both in hardcopy (at a scale so that the map representation is no smaller than 500 feet per inch) and in a CAD or other electronic format approved by the County.

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- w. Provide a cut-over plan which shows how the Applicant will minimize disruption to subscribers during any construction.

Not Applicable. System was upgraded to HFC in 1998/1999.

- x. To the extent not already explained, plans for interconnecting the cable system with other broadband communications networks in the Washington, DC metropolitan area. The plan should show: (1) the proposed manner in which interconnection would be accomplished; (2) to what extent and how the interconnect would permit transmission of information to and from the I-Net proposed by the Applicant and any other I-Net in the County or the Washington, DC metropolitan area; and (3) to what extent and how the interconnect will permit transmission of information to and from channels designated for PEG use on other cable systems in the County or the Washington, DC metropolitan area.

We have no current plans to interconnect the Reston cable system with other broadband communications networks in the Washington, D.C. metropolitan area. Additional interconnection capabilities will be constructed/implemented as required for the exchange of appropriate signals carried on the HSN, or I-Net. Any interconnection will be at the request of and cost to the County.

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